

REMARKS

The Examiner's attention to the present application is noted with appreciation.

35 U.S.C. § 112

In Section 6 of the Office Action, the Examiner rejected claims 1, 3-5, 9-11, 13-19, 27, 44, 48-51, 53, 55, 58, and 60-74 under 35 U.S.C. § 112 ¶ 2 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In Section 6, the Examiner asserted that it was not clear if the recited step of "creating seed particles" is a part of the "spontaneously displacing" step. The Examiner also asserted that it was not apparent where the step of creating particles becomes the step of continuing plating. In Section 9 of the Office Action, the Examiner stated that the term "activating species" does not appear in the specification.

Applicant has amended claim 1 to recite: "A deposition method comprising the steps of: providing a substrate comprising an active substrate at least one material selected from the group consisting of a metal, metal alloy, and metal containing compound; contacting the substrate with a non-aqueous non-conducting organic solution comprising a desired deposition galvanic coating component, the desired deposition galvanic coating component having a more noble composition than the less noble composition of the active substrate; depositing seeds in a localized range on the active substrate, wherein the seeds comprise particles of the desired deposition galvanic coating component; spontaneously displacing the active substrate with the desired deposition galvanic coating component in a localized range on the active substrate adjacent to the seed sites; continuing depositing in a localized range the desired deposition galvanic coating component from the non-aqueous non-conducting organic solution onto the active substrate; and growing the deposit from the seed sites."

Thus, Applicant has deleted "creating seed particles disposed on the substrate in a localized range, the seed particles comprising an activating species" from claim 1, deleting "creating seed particles" as well as "activating species."

In Section 10, the Examiner stated that the expression "the activated substrate" lacks antecedent basis. Applicant has deleted "activated substrate" and replaced it with "active substrate" in amended claim 1.

In Section 12 of the Office Action, the Examiner rejected claims 1, 3-5, 9-11, 13-19, 27, 44, 48-51, 53, 55, 58, and 60-74 under 35 U.S.C. § 112 ¶ 1 as failing to comply with the written description requirement. As previously noted, the Examiner stated that the term "activating species" does not appear in the specification. As previously noted, Applicant has amended claim 1 to delete "activated substrate" and replaced it with "active substrate."

The Examiner also noted that "continued plating by a displacement plating process after formation of an initial layer which completely covers the substrate is contrary to the accepted method of displacement plating." Applicant has amended claim 1 in part to recite: "continuing ~~plating~~ depositing in a localized range the desired deposition galvanic coating component from the non-aqueous non-conducting organic solution onto the ~~activated~~active substrate; and growing the deposit from the seed sites."

In Section 15 of the Office Action, the Examiner rejected claims 1, 3-5, 9-11, 13-19, 27, 44, 48-51, 53, 55, 58, and 60-74 under 35 U.S.C. § 112 ¶ 1 as failing to comply with the enablement requirement. As noted in Section 12, the Examiner asserted that "continued plating by a displacement plating process after formation of an initial layer which completely covers the substrate is contrary to the accepted method of displacement plating." As noted above, Applicant has amended claim 1 in part to recite: "continuing depositing in a localized range the desired deposition galvanic coating component from the non-aqueous non-conducting organic solution onto the active substrate; and growing the deposit from the seed sites."

Thus, the Applicant has addressed each rejection of the Examiner and the amended claim 1 is now believed allowable. Claims 3-5, 9-10, 13-19, 27, 44, 48-51, 53, 55, 58, and 60-74 depend on amended claim 1 and are now also believed allowable. Claim 11 has been cancelled.

In Section 17, the Examiner stated that determination of suitable compounds would require undue experimentation. Applicant has cancelled claim 71.

Claim Rejections- 35 U.S.C. § 102

In Section 18 of the Office Action, the Examiner rejected claims 1, 3-5, 9-11, 14, 15, 27, 44, 48, 50-51, 53, 55, 58, 63, 64, 66, 67, 69, 70, 72 and 73 under 35 U.S.C. § 102(b) as being anticipated by the article "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper onto Barrier Metals," by Fang et al.

Applicant respectfully directs the Examiner's attention to the nature of the Fang et al. article (co-

authored by Applicant): See attached Declaration, which states:

1. The process recited in “An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper onto Barrier Metals,” by Fang, O’Keefe et al. is a deposition method consisting of the following three separate steps.
 - i. The first step consists of seeding Ti(N) and Ta(N) films that are disposed on a substrate with copper and palladium deposited from an organic solution.
 - ii. The substrate is then physically removed from the organic solution and rinsed with water.
 - iii. The third step consists of placing the rinsed substrate not in the organic bath of step i, but in a completely different type of bath: a standard aqueous electroplating bath, where subsequent electrolytic and electroless copper deposition on the substrate occurs. Therefore, the final deposition step does not occur in a localized range. Additionally, the final step does not occur in a non-conducting solution.
2. Fang, O’Keefe et al. do not disclose the deposition process of the present invention, which never uses electrolytic or electroless deposition from an aqueous electroplating bath. The present invention teaches a deposition method using only a non-aqueous, non-conducting organic solution, comprising the following steps, in part:
 - i. Contacting the substrate with a non-aqueous, non-conducting organic solution and depositing seeds in a localized range on the active substrate.
 - ii. Continuing depositing in a localized range the desired deposition galvanic coating component from the non-aqueous, non-conducting organic solution onto the active substrate.

Fang teaches aqueous electrochemical copper deposition after seeding Ti(N) and Ta(N) films with organic solution deposited copper and palladium. Fang specifically recites: “It was demonstrated that copper and palladium depositions from organic solutions were compatible with subsequent electrolytic and electroless copper deposition from standard electroplating baths (see Abstract), i.e. the specimen was removed from the organic bath, rinsed, then subsequently placed in the electrolytic bath. Fang teaches depositing a Cu layer using standard electroless or electrolytic deposition from an aqueous solution, not an organic solution (see page 5, last full paragraph) after the initial seeding from an organic solution. Fang et al. recites: “Once a suitable seed layer was present, a Cu layer could be deposited using standard electroless or electrolytic deposition.”

Applicant in amended claim 1 teaches “continuing depositing in a localized range the desired deposition galvanic coating component from the non-aqueous non-conducting organic solution onto the active substrate; and growing the deposit from the seed sites.” Nowhere does Fang teach continuing depositing from a non-aqueous organic, non-conducting, solution. Applicant therefore believes that independent claim 1 and all dependent claims 3-5, 9-10, 14, 15, 27, 44, 48, 50-51, 53, 55, 58, 63, 64, 66, 67, 69, 70, 72 and 73 are now allowable.

Additionally, Applicant directs the Examiner's attention to the Specification on page 6, lines 1-2, lines 12-13, and lines 17-18 where Applicant discloses that Fang et al. do not discuss the particular deposition process of the present invention, which uses localized deposition resulting from a non-conducting organic solution.

Claim Rejections - 35 U.S.C. § 103(a)

In Section 43 of the Office Action, the Examiner rejected claim 13 under 35 U.S.C. § 103(a) as being unpatentable over Fang et al. "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper Onto Barrier Metals" alone or in view of O'Keefe (U.S. 5,228,903).

As stated previously by the Applicant, nowhere does Fang teach or render obvious continuing depositing in a localized range the desired deposition galvanic coating component from the non-aqueous non-conducting organic solution onto the activated substrate; and growing the deposit from the seed sites. Fang teaches away from continuing depositing from an organic solution: Fang teaches continuing plating from a conventional aqueous electrochemical solution (see Abstract). Applicant therefore believes that dependent claim 13 is allowable.

In Section 45 of the Office Action, the Examiner rejected claim 61 under 35 U.S.C. § 103(a) as being unpatentable over Fang et al. "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper Onto Barrier Metals" alone or in view of O'Keefe (U.S. 5,228,903).

In Section 46 of the Office Action, the Examiner rejected claims 16-19, 62, 65, and 72 under 35 U.S.C. § 103(a) as being unpatentable over Fang et al. "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper Onto Barrier Metals" as applied to claims 1, 3-5, 9-11, 14, 15, 27, 44, 48, 50, 51, 53, 55, 58, 63, 64, 66, 67, 69, 70, and 73 above, and further in view of the Lowenheim text *Electroplating*.

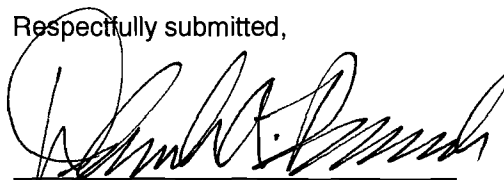
In Section 49 of the Office Action, the Examiner rejected claim 68 under 35 U.S.C. § 103(a) as being unpatentable over Fang et al. "An Alternative Metallic Seeding Technique for Subsequent Electrochemical Deposition of Copper Onto Barrier Metals" as applied to claims 1, 3-5, 9-11, 14, 15, 27, 44, 48, 50, 51, 53, 55, 58, 63, 64, 66, 67, 69, 70, and 73 above, and further in view of the Lowenheim text *Modern Electroplating* and Cimermancic et al. (U.S. Pat. 6,284,123), both of record.

As stated previously by the Applicant, nowhere does Fang teach or render obvious continuing depositing the desired deposition galvanic coating component from the non-aqueous, non-conducting, organic solution. Fang teaches away from continuing depositing from an organic solution: Fang teaches continuing plating from a conventional aqueous electrochemical solution (see Abstract). Therefore, Applicant believes all claims are now allowable.

If any issues remain, or if the Examiner believes that prosecution of this application might be expedited by discussion of the issues, the Examiner is cordially invited to telephone the undersigned attorney for Applicant at the telephone number listed below.

Also being filed herewith is a Petition for Extension of Time to December 28, 2009, which is the first business day following December 25, 2009, with credit card authorization for the appropriate fee. Authorization is given to charge payment of any additional fees required, or credit any overpayment, to Deposit Acct. 13-4213.

Respectfully submitted,



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